MA211: Assignment # 7

Required Reading.

- Sections 4.2 & 4.3.

Any problems marked with * require the use of maple. All other problems are to be done by hand. Any problems marked with # can be submitted for review by the grader.

1. Textbook §4.2: 4#, 14, 17, 19, 28#, 36, 38#
2. Textbook §4.3: 4#, 7, 10, 12#, 16#, 17, 20, 21, 24#, 29, 30
3. *# Suppose that the displacement of an unforced unit mass attached to a spring is described by

$$x(t) = 3e^{-t}\cos(\sqrt{2}t)$$

for $0 \leq t < 1$. Beginning at time $t = 1$, a force with constant magnitude $f(t) = 5$ units is applied for a duration of 7 units of time.

   (a) Write a differential equation initial value problem describing the displacement of the mass for all $t > 0$.

   (b) Apply a Laplace transform to the problem from part a) to obtain the laplace transform of displacement, $\mathcal{L}\{x(t)\} = X(s)$.

   (c) Invert the transform from part b) to find $x(t)$. Plot the solution for $t \in [0, 20]$.